Amendments To The Claims

1-52. (Cancelled)

53. (Previously presented) A method of detecting an ion in a sample, comprising:

contacting a nucleic acid enzyme with a sample suspected of containing the ion, to produce a product; and

measuring an amount of the product produced;

wherein the ion is in the presence of other ions,

the enzyme is dependent on the ion to produce the product from a substrate, and

the substrate comprises a fluorophore and the enzyme comprises a quencher of the fluorophore, or the enzyme comprises a fluorophore and the substrate comprises a quencher of the fluorophore.

54. (Previously presented) The method of claim 53, wherein the nucleic acid enzyme comprises a ribozyme.

55. (Previously presented) The method of claim 53, wherein the nucleic acid enzyme comprises a deoxyribozyme.

56. (Previously presented) The method of claim 53, wherein the nucleic acid enzyme and the substrate comprise separate nucleic acid strands.

57. (Previously presented) The method of claim 53, wherein the enzyme is linked to a support.

58. (Previously presented) The method of claim 53, wherein the substrate comprises at least one ribonucleotide.

59. (Previously presented) The method of claim 55, wherein the deoxyribozyme comprises a single strand.

60. (Previously presented) The method of claim 53, wherein the ion is a divalent cation.

61. (Previously presented) The method of claim 60, wherein the divalent cation is selected from the group consisting of Mg^{2+}, Ca^{2+}, Mn^{2+}, Co^{2+}, Ni^{2+}, Zn^{2+}, Cd^{2+}, Cu^{2+}, Pb^{2+}, Hg^{2+}, Pt^{2+}, Ra^{2+}, Ba^{2+} and Sr^{2+}.

62. (Previously presented) The method of claim 53, wherein an array of nucleic acid enzymes comprises the nucleic acid enzyme.

63. (Previously presented) A method of detecting an ion in a sample, comprising:

contacting a nucleic acid enzyme with a sample suspected of containing the ion, to produce a product; and

measuring an amount of the product produced by fluorescence;

wherein the ion is in the presence of other ions, and

the enzyme is dependent on the ion to produce the product from a substrate.

64. (Previously presented) The method of claim 63, wherein the nucleic acid enzyme comprises a ribozyme.

65. (Previously presented) The method of claim 63, wherein the nucleic acid enzyme comprises a deoxyribozyme.

66. (Previously presented) The method of claim 63, wherein the nucleic acid enzyme and the substrate comprise separate nucleic acid strands.

67. (Previously presented) The method of claim 63, wherein the enzyme is linked to a support.

68. (Previously presented) The method of claim 63, wherein the substrate comprises at least one ribonucleotide.

69. (Previously presented) The method of claim 65, wherein the deoxyribozyme comprises a single strand.

70. (Previously presented) The method of claim 63, wherein the ion is a divalent cation.

71. (Previously presented) The method of claim 70, wherein the divalent cation is selected from the group consisting of Mg^{2+}, Ca^{2+}, Mn^{2+}, Co^{2+}, Ni^{2+}, Zn^{2+}, Cd^{2+}, Cu^{2+}, Pb^{2+}, Hg^{2+}, Pt^{2+}, Ra^{2+}, Ba^{2+} and Sr^{2+}.

72. (Previously presented) The method of claim 63, wherein an array of nucleic acid enzymes comprises the nucleic acid enzyme.

73. (Previously presented) The method of claim 63, wherein the ion is Pb^{2+}.

74. (Previously presented) A method of detecting an ion in a sample, comprising:

contacting a nucleic acid enzyme with a sample suspected of containing the ion, to produce a product; and

measuring an amount of the product produced;

wherein the ion is in the presence of other ions and the ion is a divalent cation, and

the enzyme is dependent on the ion to produce the product from a substrate.

75. (Previously presented) The method of claim 74, wherein the nucleic acid enzyme comprises a ribozyme.

76. (Previously presented) The method of claim 74, wherein the nucleic acid enzyme comprises a deoxyribozyme.

77. (Previously presented) The method of claim 74, wherein the nucleic acid enzyme and the substrate comprise separate nucleic acid strands.

78. (Previously presented) The method of claim 74, wherein the enzyme is linked to a support.

79. (Previously presented) The method of claim 74, wherein the substrate comprises at least one ribonucleotide.

80. (Previously presented) The method of claim 76, wherein the deoxyribozyme comprises a single strand.

81. (Previously presented) The method of claim 74, wherein the divalent cation is selected from the group consisting of Mg^{2+}, Ca^{2+}, Mn^{2+}, Co^{2+}, Ni^{2+}, Zn^{2+}, Cd^{2+}, Cu^{2+}, Pb^{2+}, Hg^{2+}, Pt^{2+}, Ra^{2+}, Ba^{2+} and Sr^{2+}.

82. (Previously presented) The method of claim 74 wherein an array of nucleic acid enzymes comprises the nucleic acid enzyme.

83. (Previously presented) The method of claim 74, wherein the ion is Pb^{2+}.

84. (Withdrawn) A composition for detecting an ion in a sample, comprising:

a nucleic acid enzyme,

a substrate,

a fluorophore, and

a quencher of the fluorophore,

wherein the enzyme is dependent on an ion to produce a product from the substrate, and

the substrate comprises the fluorophore and the enzyme comprises the quencher of the fluorophore, or the enzyme comprises the fluorophore and the substrate comprises the quencher of the fluorophore.

85. (Withdrawn) The composition of claim 84, wherein the nucleic acid enzyme comprises a ribozyme.

86. (Withdrawn) The composition of claim 84, wherein the nucleic acid enzyme comprises a deoxyribozyme.

87. (Withdrawn) The composition of claim 84, wherein the nucleic acid enzyme and the substrate comprise separate nucleic acid strands.

88. (Withdrawn) The composition of claim 84, further comprising a support linked to the enzyme.

89. (Withdrawn) The composition of claim 84, wherein the substrate comprises at least one ribonucleotide.

90. (Withdrawn) The composition of claim 86, wherein the deoxyribozyme comprises a single strand.

91. (Withdrawn) The composition of claim 84, wherein the ion is a divalent cation.

92. (Withdrawn) The composition of claim 84, wherein the divalent cation is selected from the group consisting of Mg^{2+}, Ca^{2+}, Mn^{2+}, Co^{2+}, Ni^{2+}, Zn^{2+}, Cd^{2+}, Cu^{2+}, Pb^{2+}, Hg^{2+}, Pt^{2+}, Ra^{2+}, Ba^{2+} and Sr^{2+}.

93. (Withdrawn) The composition of claim 84, wherein an array of nucleic acid enzymes comprises the nucleic acid enzyme.

94. (Withdrawn) The composition of claim 84, wherein the ion is Pb^{2+}.

95. (Currently amended) A method of detecting the presence of an ion, comprising:

(a) contacting a nucleic acid enzyme, wherein the enzyme is dependent on the ion to produce a product from a substrate, with a sample suspected of containing the ion; and

(b) measuring an amount of the product produced;

wherein the ion is in the presence of other ions, and the ion is Pb^{2+}; and

wherein the substrate comprises a fluorophore and the enzyme comprises a quencher of the fluorophore, or the enzyme comprises a fluorophore and the substrate comprises a quencher of the fluorophore.

96. (Previously presented) The method of claim 95, wherein the nucleic acid enzyme comprises a ribozyme.

97. (Previously presented) The method of claim 95, wherein the nucleic acid enzyme comprises a deoxyribozyme.

98. (Previously presented) The method of claim 95, wherein the nucleic acid enzyme and the substrate comprise separate nucleic acid strands.

99. (Previously presented) The method of claim 98, wherein a 5'-end of the substrate comprises the fluorophore.

100. (Previously presented) The method of claim 98, wherein a 3'-end of the enzyme comprises the quencher for the fluorophore.

101. (Previously presented) The method of claim 98, wherein the fluorophore is TAMRA.

102. (Previously presented) The method of claim 101, wherein the quencher is DABCYL.

103. (Previously presented) The method of claim 98, wherein the enzyme is linked to a support.

104. (Previously presented) The method of claim 98, wherein the substrate comprises at least one ribonucleotide.

105. (Previously presented) The method of claim 98, wherein the substrate comprises the nucleic acid sequence of SEQ ID NO:2.

106. (Previously presented) The method of claim 98, wherein the enzyme comprises the nucleic-acid sequence of SEQ ID NO:1.

107. (Previously presented) The method of claim 97, wherein the deoxyribozyme comprises a single strand.

108. (Previously presented) The method of claim 107, wherein the single strand comprises the fluorophore.

109. (Previously presented) The method of claim 108, wherein the single strand further comprises the quencher for the fluorophore.

110. (Previously presented) The method of claim 107, wherein the single strand comprises the nucleic acid sequence of SEQ ID NO:1.

111. (Previously presented) The method of claim 110, wherein the single strand further comprises the nucleic acid sequence of SEQ ID NO: 2.

112. (Previously presented) The method of claim 95, wherein the product comprises a nucleic acid.

113. (Previously presented) The method of claim 112, wherein the nucleic acid comprises the fluorophore.

114. (Previously presented) The method of claim 112, wherein the nucleic acid comprises the fluorophore quencher.

115. (Previously presented) The method of claim 95, wherein the sample suspected of containing the ion comprises a water sample.

116. (Previously presented) The method of claim 95, wherein the sample suspected of containing the ion comprises a bodily fluid.

117. (Previously presented) The method of claim 116, wherein the bodily fluid is blood.

118. (Previously presented) The method of claim 95, wherein the measuring comprises a measurement of fluorescence.

119. (Previously presented) The method of claim 118, wherein the measurement of fluorescence is selected from the group consisting of fluorescence intensity, fluorescence lifetime, and anisotropy.

120. (Previously presented) The method of claim 119, wherein an increase in fluorescence is indicative of the presence of the ion.

121. (Previously presented) The method of claim 95, wherein an array of nucleic acid enzymes comprises the nucleic acid enzyme.

122. (Currently amended) ~~A~~ The method of claim 95 ~~determining the concentration of an ion in a sample~~, further comprising:

~~(a) contacting a nucleic acid enzyme, wherein the, enzyme is dependent on the ion to produce a product from a substrate, with the sample containing an unknown concentration of the ion;~~

~~(b) measuring an amount of the product produced; and~~

(c) comparing the measurement obtained in (b) with that of a standard curve created using known concentrations of the ion~~;~~

~~wherein the ion is in the presence of other ions; the ion is Pb^{2+}; and~~

~~wherein the substrate comprises a fluorophore and the enzyme comprises a quencher of the fluorophore, or the enzyme comprises a fluorophore and the substrate comprises a quencher of the fluorophore~~.

123. (Previously presented) The method of claim 122, wherein the nucleic acid enzyme comprises a ribozyme.

124. (Previously presented) The method of claim 122, wherein the nucleic acid enzyme comprises a deoxyribozyme.

125. (Previously presented) The method of claim 122, wherein the nucleic acid enzyme and the substrate comprise separate nucleic acid strands.

126. (Previously presented) The method of claim 125, wherein a 5'-end of the substrate comprises the fluorophore.

127. (Previously presented) The method of claim 126, wherein a 3'-end of the enzyme comprises the quencher for the fluorophore.

128. (Previously presented) The method of claim 125, wherein the fluorophore is TAMRA.

129. (Previously presented) The method of claim 128, wherein the quencher is DABCYL.

130. (Previously presented) The method of claim 125, wherein the enzyme is linked to a support.

131. (Previously presented) The method of claim 125, wherein the substrate comprises the nucleic acid sequence of SEQ ID NO:2.

132. (Previously presented) The method of claim 125, wherein the enzyme comprises the nucleic acid sequence of SEQ ID NO:1.

133. (Previously presented) The method of claim 124, wherein the deoxyribozyme comprises a single strand.

134. (Previously presented) The method of claim 133, wherein the single strand comprises the fluorophore.

135. (Previously presented) The method of claim 122, wherein the product comprises a nucleic acid.

136. (Previously presented) The method of claim 135, wherein the nucleic acid comprises the fluorophore.

137. (Previously presented) The method of claim 135, wherein the nucleic acid comprises the fluorophore quencher.

138. (Previously presented) The method of claim 122, the sample suspected of containing the ion comprises a water sample.

139. (Previously presented) The method of claim 122, wherein the sample suspected of containing the ion comprises a bodily fluid.